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ABSTRACT

This study was commissioned by the American Institute of Architects because of a widespread feeling that education for environmental design must change. The purpose of this study is to focus and give direction to the many changes that are taking place in environmental design education today. Emerging from the study was a process for planning and evaluating the unprecedented diversity of new programs that are needed if teams of well-educated individuals are to develop who can work together and effectively design a more humane environment. The study includes four sections: (1) Introduction; (2) Goals, Problems, and Strategies; (3) The Process of Change; and (4) Recommendations of the Study. The Introduction is a brief overview of the problem. Goals, Problems, and Strategies includes the study method, goals, the five problems of environmental design education (continuity, scope, method, reality, and numbers) and strategies for dealing with these problems. A definition of the environmental design task and a national framework for environmental education design are included in the Process of Change. Nine recommendations conclude the study. An annotated list is given of the seven appendices to the report, which are not included in the report proper but may be ordered. (TK)

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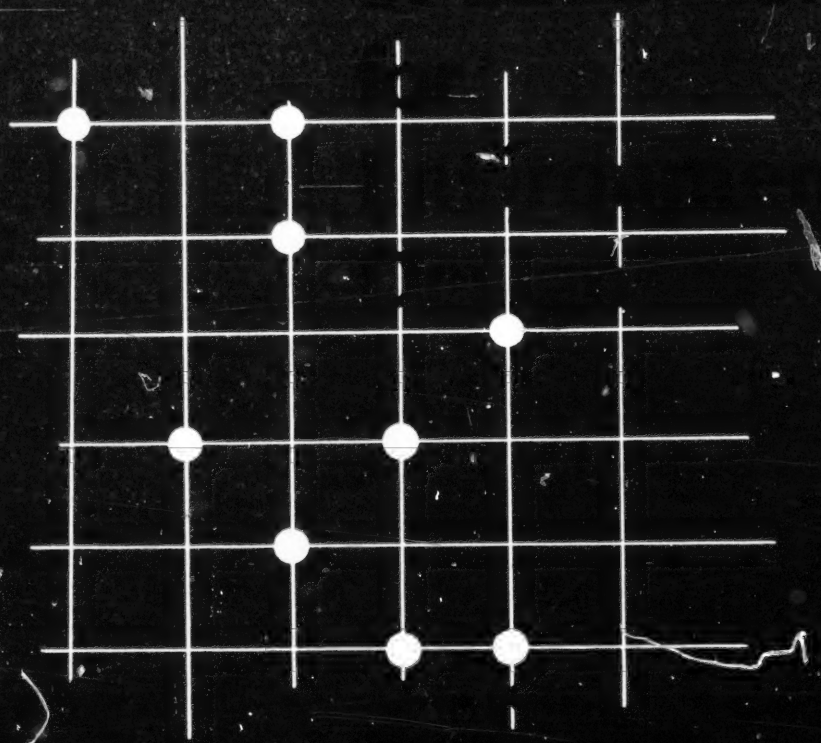

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Final Report

A Study of Education for
Environmental Design
Sponsored by the American
Institute of Architects

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Princeton University
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AIA Research in Education

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LIST OF APPENDICES

(Note: One copy of each of the appendix materials was submitted to the American Institute of Architects in fulfillment of the contract. These are not included in this report. Authors can be contacted for further information or single copies can be purchased from AIA Headquarters at a cost of $.10 per page paid in advance. Minimum order: $2.00)

1. "The Curricula of 74 Schools of Architecture in the United States", AIA Educational Research Project School of Architecture, Princeton University, June 1967.

   A printed compilation of 111 charts providing information on existing or proposed architectural curricula. The information was gathered from 74 schools between January, 1966, and June, 1967.

2. Educational Objectives, unpublished, 36 pages.

   Samples of statements of educational objectives collected during the study including First Division Studies, Computer Aided Design, Building Systems Design, Internship, Behavioral Sciences and Elementary and Secondary Education.

3. Questionnaire Responses from Practitioners, unpublished, 8 pages.

   An analysis of responses from practitioners to a questionnaire on internship, continuing education and key problems.

4. Plans and Policies of Educational Institutions, unpublished, 193 pages.

   A group of statements on educational plans and policies from representatives of seventy-one schools of architecture.

5. "Creative Problem Solving in Architecture" (2 Volumes), by Gary T. Moore and Lynne Meyer Gay, Department of Architecture, University of California, Berkeley, California, September 1967, approximately 196 pages, mimeographed.

   A report developed under a grant from the AIA Research in Education Project at Princeton University.

6. "Inventing the Future Environment", a preliminary not-for-publication, transcript of a conference, October 1966, several hundred pages.

   Transcript of a conference held at Dedham, Massachusetts October 13-16, 1966 by the Department of Architecture of the Massachusetts Institute of Technology, jointly sponsored by the AIA Research in Education Project, M.I.T., and the Graham Foundation for Advanced Studies in the Fine Arts.

7. "Computer Analysis of the Alternative Educational Careers Contained in the Recommended National Framework for Environmental Design Education", Princeton University, unpublished, 61 pages 11"x14".

   A computer print-out of all possible course sequence alternatives for 1 to 6 modules of education using the nine basic educational programs.

INTRODUCTION

This study was commissioned by the American Institute of Architects because of a widespread feeling that education for environmental design must change. Underlying this feeling is a healthy increase in public awareness of the physical setting our society has created for its activities. Laymen and professionals alike have been examining this setting and finding that it more often thwarts rather than supports the kind of life our society wants to live.

Thus, there is a growing sense of urgent need to develop understanding and abilities that will help us to shape our environment in a better way. We can conceive of a man-made setting that will enhance the opportunity of every individual to attain such goals as freedom of choice, sound physical and mental health and a richness and depth of human experience.

Throughout the recorded history of man, societies have acted on the belief that the physical environment could be shaped and changed in a way that will support and enrich the life that people lead. The study of history reveals that people have, from time to time, succeeded in developing an environment that raised the quality of life. At other times, people have failed to provide a physical setting for their needs and aspirations and have suffered as a result.

In recent times, the shaping of the environment has become such a large and complex process, and the goals of society have become so diverse and dynamic, that there is a recognized need for specially trained professionals to carry the main burden of this task. It is no longer possible, as it was in Thomas Jefferson's day, for a well-educated layman to command the knowledge, skills and time needed to produce a fitting environment for a home or a university campus.

During the past hundred years, we have seen the institutionalization of training for environmental design in the schools of architecture, engineering, city planning, landscape architecture and in some instances in schools of industrial design and interior design. These schools have tried to teach young men and women how to deal with parts of a central problem: how to plan for and execute physical changes in the environment in a way that will satisfy the needs of society.

In a day when society's needs were easily identified and changed slowly, schools of environmental design often demonstrated strong leadership in raising the aspirations of the public and the level of performance of the practicing professional. But today we live in a period of growing complexity, rapid change and, most significant of all, rising expectations. And the schools, as they are now organized, are (with too few notable exceptions) no longer providing leadership and a sense of direction for the professions and for the public. This is a grievous loss for there is no institution in the nation which is better equipped with the basic resources for the development of purposeful innovation than our colleges and universities.

Before examining the problems that have caused the schools of environmental design to lack the initiative they have sometimes held, it is important to emphasize the hopeful circumstances surrounding this lack. First of all, young men and women are finding the task of designing the environment more compelling than ever before. Larger numbers of better qualified students are seeking admission to programs in this field. Standards of performance are being steadily raised by the schools. Second, there is a willingness to search for new approaches, to change curricula and teaching methods, that is apparent at almost every school that teaches environmental design.

This willingness to explore new ways of educating professionals is not limited to schools of environmental design. Higher education in all fields is subjecting itself to searching questions of purpose, direction and effectiveness. It must be realized that this is happening at a time when the graduates of the schools are reaching unprecedented levels of knowledge and competence. However, the complexity of the problems the public now recognizes and wants to solve and our expectations that these problems can indeed be quickly and effectively solved are increasing at a rapid rate. The rate at which the schools and the profession have been able to improve their performance has been substantial. But it has not been great enough to keep up with the revolution of rising expectations.

A basic supposition of this study has been that the public demand for more effective performance by the environmental design professions is healthy and encouraging. And while environmental designers may never find the magic that allows them to penetrate unerringly to the heart of every complicated problem and solve it quickly, we can learn to do a far better job. Our society need not be one of those which builds for itself a setting for frustration and suffering.

The purpose of this study has been to focus and give direction to the many changes that are taking place in environmental design education today. We have searched for the keys to the problems of complexity and dynamism in society which have been the motivating forces behind the changes in education. This complexity and dynamism are rooted in the way that our knowledge of our world has increased. The growth of population and technology, for example, are seen as the products of and not the causes of the expansion of knowledge.

The most important aspect of the growth of knowledge has been qualitative rather than quantitative. If we had merely

added to an encyclopaedic storehouse of facts, the growth of knowledge would not have had such an enormous impact on society. Rather it is our increasing understanding of relationships, the relationships between the actions and events in all realms of life, that has had the greatest effect on how we comprehend and deal with our problems.

We can understand today how the changing of any part of our physical environment affects and interacts with every other aspect of that environment. For example, we can trace the way in which decisions on the regional scale (e.g., water resource allocation) can affect the way we must design appliances. And we can define many ways in which the addition of every new building affects the public use of an entire city. We can now understand that no decision about physical design is wholly independent. This is why this study has chosen to deal with education for environmental design rather than separately with architecture, engineering, planning or any other of the traditional disciplines. As our knowledge grows of the way that the work of the traditional disciplines must always interact in the real world, it becomes difficult to put the educational problems of these disciplines into separate compartments.

In practice, we have learned to assemble teams of many different environmental design disciplines in response to complex design problems. And we shall be obliged to do so increasingly in the future. But it is only rarely that the education of the team members has prepared them to make the fullest contribution they might in such a setting.

Of more far reaching significance is the growth of knowledge of another set of relationships. We are beginning to understand today, as we seldom have in the past, the way that changes in the physical environment are inextricably linked to changes in the social, economic and political environment.

For many years, gifted historians have been developing insights into the relationship of building styles and types to the distribution of wealth, the division of social classes or to long-standing political conflicts. Today, the social and behavioral sciences have further enriched our understanding of these interactions. We have become conscious of the fact that no aspect of physical design is ever done in isolation from the psychological, social, economic and political setting. And every design decision that is made changes this setting in a way that is either favorable or unfavorable to various segments of the population. We now realize what many people thought was a rather straightforward and beneficial action (for example, replacing a slum with a new university), can have extraordinarily complex effects in today's society.

In sum, the knowledge explosion demands that the individual who wants to learn how to make a contribution to society through environmental design subject himself to a two-way stretch. He must stretch his mind in breadth to learn how his design decisions interact with the design decisions of others and also how they interact with the structure of men's lives in the non-physical realm. At the same time he must stretch in depth to keep up with an ever-expanding body of research that can help him to make the most effective decisions about any single detail of the physical environment, for example, the spatial relationships, structures, materials and methods that can be brought to bear in solving a specific problem.

For all but the genius, the two-way stretch is usually a stretch beyond the breaking point. To plan an educational policy for environmental design requires more than an understanding of the kind of knowledge that is needed. When Joseph Hudnut was Dean of the Harvard Graduate School of Design he compiled a list of all the courses in the Harvard

catalog that a well-rounded designer ought to take. The result was a twenty year long program. Clearly, we must take some measure of the human resources available when we devise new educational policies. The most critical issue faced in this study was finding a way to realistically match the almost infinite need for knowledge and skill with an optimistic view of the finite human resources available.

The approach which allowed the study to come to grips with this difficult problem of matching educational needs and human resources was the determination to deal on a nationwide basis with the process of education rather than with any particular product. The product that many expected as an outcome of the study was a sequence of courses of study that would give students of environmental design all the abilities they might need during their career. It was not difficult to determine that no single sequence of courses would be adequate for today's needs.

What did emerge from the study was a process for planning and evaluating the unprecedented diversity of new programs that are needed if we are to be able to develop the teams of well-educated individuals who can work together wisely and effectively to design a more humane environment.

GOALS, PROBLEMS AND STRATEGIES

1. The Study Method

During the course of the study, the investigators sought the views of the people and groups who would affect and be affected by changes in education for environmental design. The questions that were asked searched for concepts of present realities, central problems and future possibilities.

The searching and questioning went on in settings that were both formal and informal; the confrontations were both face to face and through the medium of the written word. The people questioned were teachers, school administrators, students, practitioners (large and small), clients and users, scientists and humanists, those deeply involved in professional activity and those looking on from an outside vantage point.

The initial outcome of the questioning was, as can be imagined, a large amount of unrelated material; description and opinion, concepts and policies, much of which looked forward, some of which looked back and some of which was firmly rooted in the present.

Only a small fraction of the basic raw material for the study promised to yield useful insights on the basis of rigorous statistical analysis. (Such analyses were made of the responses to a questionnaire for practitioners and of the new and continuing curricula of architectural schools. These appear in appendices to the report.) The main work of the study was to make constructive use of the diverse record of thought that had been gathered on the subject of environmental design education. This was done by a process of sifting and analyzing, knitting together, sharpening and adding missing links until a fresh picture and fresh possibilities emerged.

The outcome of this effort was the formulation of a set of broad goals for environmental design education, the identification of the key problems and some of the most promising strategies for the schools and, most important of all, the development of a working process for change that can provide purpose and direction without preempting decisions that rightfully belong to others.

2. Three Major Goals for Education

At the outset, the study did not intend to define broad goals for environmental design education. This neglect of a traditional first step was based on the impression that most statements of general goals for education had little useful meaning. The language in which they are couched is usually so ambiguous that no one can tell from the evidence of the real world whether such goals have been achieved or not. Yet many of the views the study heard were in the form of broad goal statements or implied broad goals. Such pervasive behavior could hardly be ignored.

As the evidence was examined further, certain underlying characteristics of such goal statements became apparent. Broad goal statements never seemed to raise any of the issues that were the source of differences of opinion concerning education which were known to exist. This was because the goal statements usually specified some desired status for institutions or groups. Next, it was realized that these descriptions of status implied, but did not spell out a pattern of acceptable behavior by the group or institution. And differing views of what constitutes acceptable behavior were at the root of the real issues and the hidden conflicts.

The source material was reviewed again in an effort to discover the underlying conflicts. These conflicts were

crystallized in three statements, each one of which represents a different set of priorities for the educational process. While almost every person concerned would be likely to opt for a slightly different balance between these three statements of goals, most would accept that all three are valid and worth pursuing. This property of the statements makes them a useful tool in clarifying the discussion of educational policy. All three refer to the behavior of students (or graduates) rather than their status:

a. A student (or graduate) should be able to work effectively within the real world constraints of present day practice.

This statement implies an ability to make the most effective use of the resources of money, time and skill that are actually available. The needs expressed by the client and the user are the basis for the solution of the problem. And the technological, social and political patterns of the time will be respected in the solution. This does not imply that the designer will not try to influence those around him to change in a direction he thinks will be beneficial. But he should not assume major changes in the "rules of the game" that are beyond the immediate control of the people with whom he must work.

b. A student (or graduate) should be able to comprehend the continuing changes in the social, economic, scientific and technological setting of our society. He should be able to constantly renew and adapt his abilities in response to these changes.

The second goal statement implies that the student should have a basic grounding in the widest possible range of knowledge. He needs a command of the vocabulary and conceptual framework of many fields, and a multi-faceted picture of the present

state of the world as a basis for recognizing the changes that take place. He must take a large varied diet of reading and experience. And he must be able to question, dismantle and reconstruct with speed and ease his ways of dealing with problems. This goal suggests a highly adaptive personality but provides no basis for a sense of conviction or direction.

c. A student (or graduate) should be able to formulate a concept of a better environment beyond present day constraints to give direction to his adaptability.

The third goal statement implies the development of a set of values that cannot be fulfilled unless society undergoes significant structural changes. The extreme realization of this ability results in pure Utopian thinking. This kind of thinking has not been without the power to change men's lives and the course of society. However, many men have also been able to find practical concepts of a better future that were realized by changing the political, economic or social setting or by means of scientific or technical discoveries.

The conflicts between the goals are of two kinds: First, there is the conflict for the finite amount of time and energy a student possesses and second, there is a conflict of attitude. Students and graduates alike are motivated by the rewards they feel are attached to the achievement of each of the goals. These rewards may be internal, self-satisfaction; or external, the admiration of others. It is seldom that a teacher or a school can conceal the fact that it honors the achievement of one of these goals more than the other two. And it is rare that a student's attitudes and abilities will not be given shape and form by the way he balances his time and effort in moving toward each of the three goals.

The broad goals, stated in a form that reflects the issues and conflicts that must be resolved in order to set policy and priorities for a school, lose their ambiguity and become a useful tool in the decision-making process. And the discourse that must take place between groups that may naturally have different interests in the outcome of the educational process can be focused on central issues rather than secondary details by the use of this set of concepts.

3. The Five Problems of Environmental Design Education

The study analyzed many different expressions of the specific problems that are troubling the student, the teacher, and the practitioner as they exercise their understanding and abilities in environmental design. Many of these expressions took the form of accusations of the groups and institutions that seemed to stand in the way of anyone trying to do the best possible job. Underlying the large variety of complaints and frustrations, however there was a consistent structure of five types of problem that were recurring: problems of continuity, scope, method, reality and numbers. These five, then, do seem to be the root problems of environmental design education.

a. Continuity

There are two aspects to the problem of continuity of education. The first reflects a lack of connection between the concepts and values of the environmental design team and the ideas of many of the clients and users who play a role in the decision-making process. The second aspect of the problem is created by the present rigid time structure of professional education.

The lack of continuity between the education of those who use the environment and those who design it has occasionally been overcome by a process of mutual re-education during the development of a specific project. But the conditions that favor this process are all too seldom present. Just as often, the designers, the clients and users are not fully aware of the differences in their views until the project has been executed. There is little reason to expect that changes in education can bring a millenium when all those who are affected by an environmental change will find a perfect consensus. But a shared understanding of the concepts and values of design can lead to a more open and just resolution of differences when they do exist. And beyond the value that environmental design education for non-designers may have in clarifying the decision-making process, there are other benefits. The richness and quality of life may be raised for the layman as he becomes more sensitive to the effects of his surroundings.

A young man or woman entering a program of professional education for environmental design today is usually faced with a monolithic program. From the outset there must ordinarily be a commitment to four to six years of pre-ordained course work. If the student cannot survive to the end, and the majority today do not, he must face the world of work as a failure. If he persists until he receives his degree, he is plagued by the uneasy feeling that he can never learn all that he must know to maintain his competence to the end of his professional career. There is no continuity of steps during and after the academic training period that could accommodate the wide range of ability and motivation that we know exists in our school population. This lack of continuity has been wasteful of human resources needed for the task of environmental design.

b. Scope

The problems of environment are no longer parceled out in neat, uniformly scaled packages as they were so often in the past. The real problems of society do not respect the boundaries of scale or scope. They range across traditional limits from a small component to a region; from basic research to project administration.

The environmental design team must find a way to relate the way it solves problems from the small scale component to the broad region. It must also learn to better relate research, development and practice. This implies that the traditional focus on one or two kinds of problems at schools in the various branches of environmental design must be broadened. Consequently, many schools are now struggling to find ways to increase the breadth of understanding of environmental problems over a wider range.

But with every increase in breadth, there is a clear danger of the loss of the depth of skill, understanding and experience that is necessary for competent performance in practice. One of the most difficult decisions a school or a student must make concerns the balance that must be struck between educational experiences that are broadening and experiences that lead to specialized abilities. Another difficult choice that faces the schools is selecting the method that may be used to introduce breadth of understanding. A student may work with a teacher who has related and synthesized a broad range of experience, with a large number of specialists in different areas or some combination of the two. Each of these patterns is likely to produce a different kind of understanding and problem-solving approach.

c. Method

The traditional patterns of teaching design based essentially on the apprenticeship model and emulation of a master cannot be easily adapted to the need for a broader range of competence. This is not to say that the qualities of leadership, imagination and independent thought that characterized the best of the old style masters are not still needed in a team effort. In fact they are essential if the work of the team is not to be reduced to the lowest common denominator. Some way must be found to allow the strengths of the team members to add up to more than the sum of the individual efforts rather than to compete with each other. Many schools, researchers and practitioners are searching for design methods that make explicit the way that different abilities may be related in the problem-solving process.

Workable design methods that meet all the needs of the environmental design team have not yet been perfected. The lack of methods that are readily understood, that can unify the participants in the design process and take maximum advantage of both the intuitive strengths and rigorous analytical abilities of the team is a problem in both education and practice. The development of reliable, explicit design methods may be the only way we can hope to deal with the increased scope and complexity of our problems without enormously increasing the length of time the student must spend in school or the length of time a practitioner must devote to a problem in his office.

It should be made clear that explicit design methods do not necessarily eliminate creativity and imagination. One can expect that both good methods and bad methods will be developed and proposed in the process of search that is now going on. The bad methods will fail to make

use of the problem-solving skills we already have at our command and the good methods will amplify these skills. However, at the present state of the art, it remains difficult to distinguish the good from the bad.

d. Reality

An increasing number of students and schools want to focus their concern on the role of environmental design in dealing with the most pressing social, political and economic problems of our day. There is a deep desire to make active, constructive use of the ideals held by teachers and students alike. The traditional form of highly abstract school problems has less and less motivating power. And there is a growing sense of doubt that the really important problems of today can be dealt with on the traditional level of abstraction. The actual problems of the community are considered the most vital subject matter for study.

Active participation in community problems is not easily accomplished. Nor can it accomplish all of the objectives of an educational program. A community may take many years to resolve a problem. Its current problems are not likely to be representative of the total range that an environmental design team must learn to deal with. Clearly a student can miss a great deal if he confines his attention to a small segment of a current problem. An educational program must find the means to balance fragmented, empirical field experience with a longer perspective and the ability to find useful theory. And students who have not yet formulated the understanding required to participate in the resolution of complex, real world problems may often find their role in community affairs reduced to that of the helpless bystander.

e. Numbers

The study attempted to find a reliable method for projecting the numbers of environmental design professionals that will be required at some future time. The naive notion that this could be done by extrapolating current employment statistics in proportion to estimates of the growth of construction expenditures had to be rejected. There is no acceptable way to account for many unpredictable but likely changes in the way designers participate in the construction process. Productivity on many present day tasks may rise phenomenally as data processing machinery and programs are developed. At the same time, the public may come to demand a much greater use of design service per construction dollar spent.

There is no doubt that a simple construction projection would indicate the need for many more people involved in environmental design in the future. But however high this number may be, it could be multiplied or divided several times as a result shift in the public's view of the role of the designer in our society. This places education in the key position in determining tomorrow's manpower needs in environmental design. If the abilities developed by the educational process are highly valued by society, the demand for manpower may rise at an unprecedented rate. If the schools do not produce people who can create new values in the man-made environment, the demand for students of environmental design might well diminish.

There are many signs today that our nation is becoming more and more interested in the quality of the environment. This, together with the growing vigor of the schools in their search for more effective educational programs, seems to promise that the demand for people trained in environmental design will far outstrip the supply in the coming years. If this is the case, there

will be a series of problems the schools must face: how to attract able people to teaching careers, how to raise student-faculty ratios without diminishing the effectiveness of education, how to accommodate large numbers of students without dehumanizing the learning experience. The schools of environmental design have not been the first to face these perplexing problems. It would be wise to begin testing ways to deal with them before a time of crisis. The schools which are facing such problems today have not yet provided many hopeful models for their solution.

4. Strategies for Improving Environmental Design Education

The five types of problems faced by environmental design education have no simple solutions. The study found many people who suggested hopeful ideas. But there were few who had fully tested and evaluated these ideas. Thus it would be premature for this study to propose any pat educational formulas. Rather, the study has identified the need for a greater diversity of experimentation.

Experimentation in itself does not inevitably lead to more effective solutions to the problems faced by the schools. But experimentation in the framework of the curriculum development process that has been formulated by the study should lead each school most rapidly to the discovery of the problem-solving strategies that will work best for that school.

In order to encourage the diversity of experimentation that is required today, the study has compiled a list of some of the educational ideas that have been put

forth for the solution to the key problems of environmental design education. As these ideas (and, hopefully, many others) are tested in many versions, evaluated and the results are reported, educational policy-making and planning will move toward a new level of maturity.

a. Strategies for Continuity

Environmental design education programs at the elementary school and high school levels as well as for those in higher education who will not enter the field of environmental design.

Graduated levels of achievement within professional education programs which allow students to terminate their education at the end of any two-year period and find a responsible and recognized role within the task of environmental design.

Readily available continuing education programs for those who have completed any number of years of regular academic training.

Adult education programs related to environmental design in communities across the nation.

b. Strategies for Broader Scope

Team teaching by a wide range of disciplines.

Programs to bring men with an unusually broad range of experience into the schools as teachers or short-term residents.

Joint programs between separate departments and schools involved in education related to environmental design.

Programs designed to review the full range of environmental design activities.

Options for concentration in particular skills or scales in the environmental design process.

Research to clarify the relationships among design decision-making patterns by different disciplines and at different scales.

c. Strategies for More Effective Methods

Testing and evaluation of the many models that have been proposed for more rigorous design methods by students and faculty together.

Multi-disciplinary research on problem-solving methods and development work to adapt available methods to the task of environmental design.

More intensive research and instruction in methods of determining needs and resources, of generating alternative solutions (rather than a convergent solution) and of methods for making systematic evaluations of solutions.

d. Strategies for Reality

The field station for advocacy planning and design in disadvantaged communities.

Cooperative programs with practicing professional groups.

Participant-observer periods in areas with serious environmental problems.

Organized internship experiences with practicing environmental design teams.

Internship periods in governmental agencies or organizations with large building programs.

Cooperative programs with industries related to the building of the man-made environment.

Participation of students as assistants in advanced research projects.

The use of sophisticated gaming techniques or simulation models in the teaching process.

e. Strategies for Increasing Numbers

Institutes for Advanced Studies for the development of faculty resources.

Cooperative programs combining teaching and practice.

More extensive use of independent research and study sequences.

More extensive use of stored teaching programs (on computers, TV tape, audio-tape and sound film).

More extensive use of self-evaluation and evaluation by peers.

Greater use of skillfully prepared lecture-demonstration sessions for large groups.

Greater use of students as teachers of less advanced students.

In designing experimental programs along the lines suggested above, it is useful to use the concepts of the three realms of learning or cognition identified by Jerome Bruner and his co-workers. Bruner's research indicates that there are three identifiable ways in which man perceives and deals with his environment. He terms these three modes of cognition the enactive (physical action), the iconic (direct imagery) and symbolic (abstractions in the form of words and numbers). A well-balanced educational experience should not neglect experiences in every one of these three realms.

THE PROCESS OF CHANGE

1. Defining the Environmental Design Task

The study has reviewed reports of many conferences and discussions on the subject of environmental design education. A frequent conclusion of such deliberations has been general agreement on the need for a definition of the environmental design task. A definition of this kind is seen as the only logical basis for setting basic educational policies. The study has attempted to respond to this need by formulating a workable description of the task of environmental design.

The description of the task is represented in a three dimensional diagram. This form was the result of an analysis of many different ways in which parts of the task have been described. An underlying pattern was found in conventional literary descriptions. There are three clearly different characteristics of the task that have been taken into account. The first of these characteristics was the design decision-making process. A second distinct characteristic of the task was the scope of the work to be done. And the third characteristic was the scale set by the physical boundaries of the problem. The result of relating each of these characteristics to the other two was a three dimensional diagram.

The next step in the development of the definition was to divide each of the major dimensions of the task into a workable number of distinguishable parts. The problem in doing this was one of finding generally understood and accepted words representing separate parts of the task. In some instances such generally agreed upon language was available for the description of the parts. In other instances, words which do not yet have a well established

implication had to be used to preserve the logic and generality of the description. Thus the diagram describing the task consists of a combination of familiar and new language. But new words were used only where familiar ones were not available for the difficult task of definition of a field that is itself new.

The following is the text of the three dimensional diagram which is shown in sketch form on page 25.

Process

1. Identification:
   specify the goals, needs, resources and priorities of the client, user and community groups.

2. Formulation:
   generate alternative policies, strategies and procedures for form, content and process.

3. Prediction:
   state the likely consequences of each alternative based upon rigorous and intuitive analysis.

4. Selection:
   find the alternative which best meets the performance requirements specified in step number 1.

5. Management:
   use the available resources of money, time and skills to effect the alternative selected in step number 4.

6. Evaluation:
   examine the consequences of the action taken and feed back corrections to the previous steps.

Scope

A. Basic Research

B. Applied Research

C. Pilot Study

D. Proposal

E. Communication

F. Effectuation

Scale

a. Region

b. Area

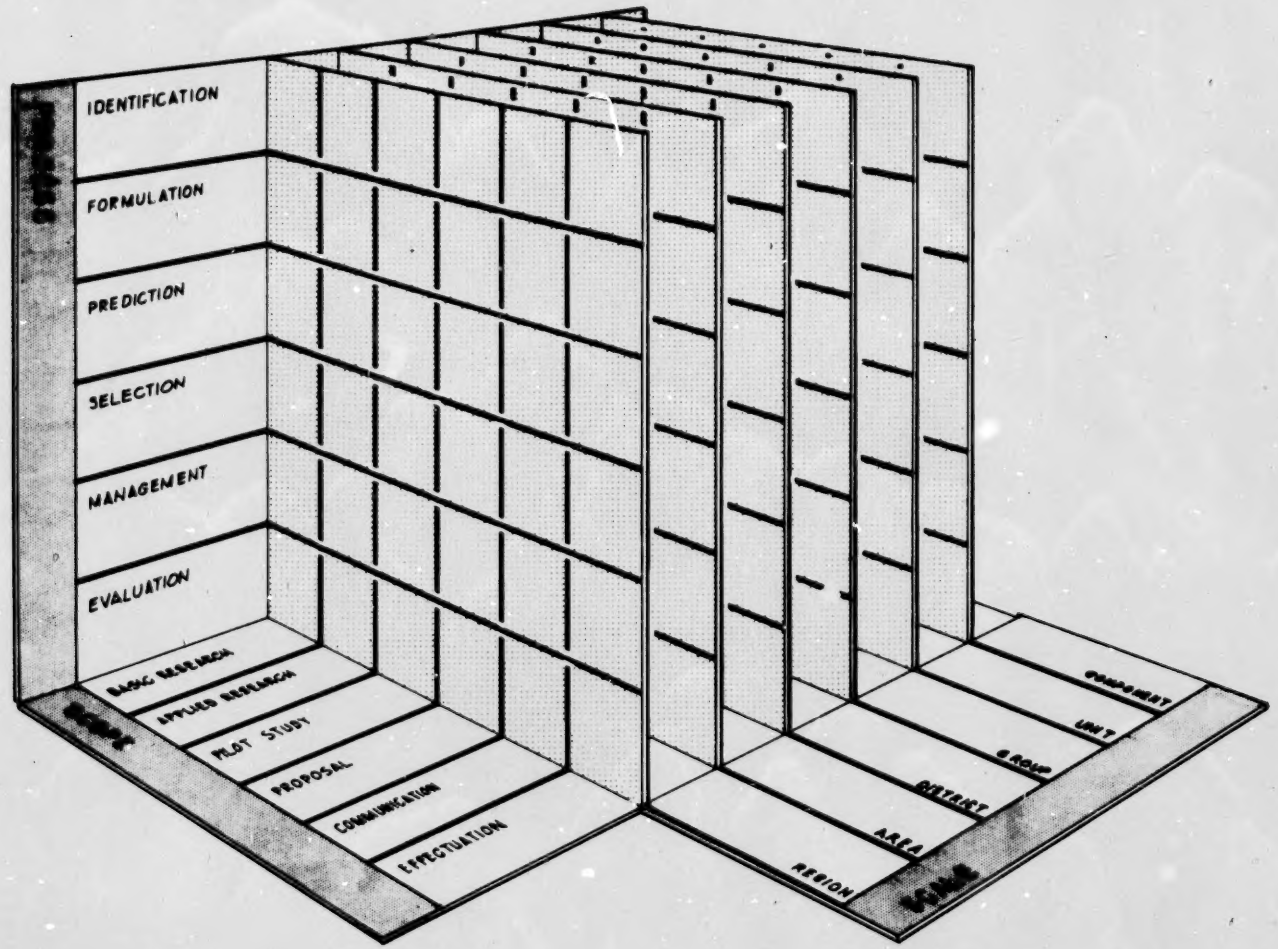
c. District

d. Group

e. Unit

f. Component

The least familiar terms that were used appear within the dimension of "scope." It would be useful to explain more fully the meaning intended for "proposal" and "communication." These unfamiliar uses of the terms were required in order to avoid limiting the definition to present day practice. Today, a "proposal" would



MODEL OF THE DEFINITION OF THE ENVIRONMENTAL DESIGN TASK

usually take the form of a set of conceptual or schematic drawings for a project. But the more general term was used so that such design responsibilities as the preparation of policy studies, feasibility studies or systems analyses could be included within the concept. In the same way "communication" today would normally take the form of reports, contracts, specifications, working drawings, shop drawings and the like. But a more general term was used to accommodate innovations in the way design concepts may be communicated to those who will carry them out. The word "effectuation" is meant to include all the actions necessary to realize the design, whatever form it might take.

It should also be noted that the general description of the decision-making process included in the "process" dimension is not necessarily sequential. The design process can be initiated at any one of the six steps listed. Work on several steps can go on simultaneously. Also, it is intended that the process be defined as a repetitive one. That is, the solution of a problem may require going through all of the steps many times in succession.

The three dimensional diagram contains two hundred and sixteen intersections (6 x 6 x 6). Each one of these represents a relationship between the three main dimensions of the task. Another way of stating this definition would be in the form of two hundred and sixteen separate sentences. Each sentence would represent an activity which is part of the environmental design task. All two hundred and sixteen sentences taken together are intended to define the entire task. Similarly, the contribution of any member of the environmental design team could be described in terms of a given number of these two hundred and sixteen task descriptions (sometimes only one, sometimes perhaps thirty or forty). The same system could be

used to describe the range of abilities expected of a graduate of an educational program in environmental design.

Some sample sentences may serve to illustrate the way that the model works to generate statements of activities:

Statement 1De would be:
Identification of the goals, needs, resources and priorities of the client, user and community groups for a design proposal at the unit (e.g., building) scale.

Statement 2Fd would be:
Formulate alternative policies, strategies and procedures for the form, content and process of a construction procedure for a group of buildings (e.g., a large hospital).

Statement 6Cf would be:
Evaluate the consequences of the action taken (and feed back corrections to the previous steps) of a pilot study of a component (e.g., a precast wall panel).

Clearly the definition of the broad task of environmental design encompassed in two hundred and sixteen such statements is not something that can be comprehended at a glance. The diagram is not intended as a display but as a working tool. To use it for the clarification of a professional career or of the educational policy of a school requires a step by step review of each of the two hundred and sixteen statements.

The actual model that has been built is equipped with a set of cards (in four shades from black to white) that can indicate the amount of emphasis the users of the model have decided to place on each one of the two hundred and sixteen activities. In this way any person or group

involved in environmental design can clearly see the implications of their own decisions about the portion of the total task they plan to deal with. The model also finds specific use in the development of the national framework for environmental design education and the process of curriculum development that will be discussed in the following two sections of this report.

2. A National Framework for Environmental Design Education

The study reviewed hundreds of school catalogs in the search for a unifying pattern that could relate all aspects of environmental design education. An effort was made to find an educational concept that would take account of present day programs, new programs that were in the planning stages and the kind of innovation that was seen to be likely in the future. There were two guiding principles in this attempt to provide a national framework for schools of environmental design. The first of these was that the least possible amount of outside constraint should be placed upon the schools. Policy making and curriculum planning should be done by the schools on the basis of the resources of funds, faculty, student body, facilities and institutional patterns of each school. The second guiding principle was that the widest range of educational careers should be open to the individual student.

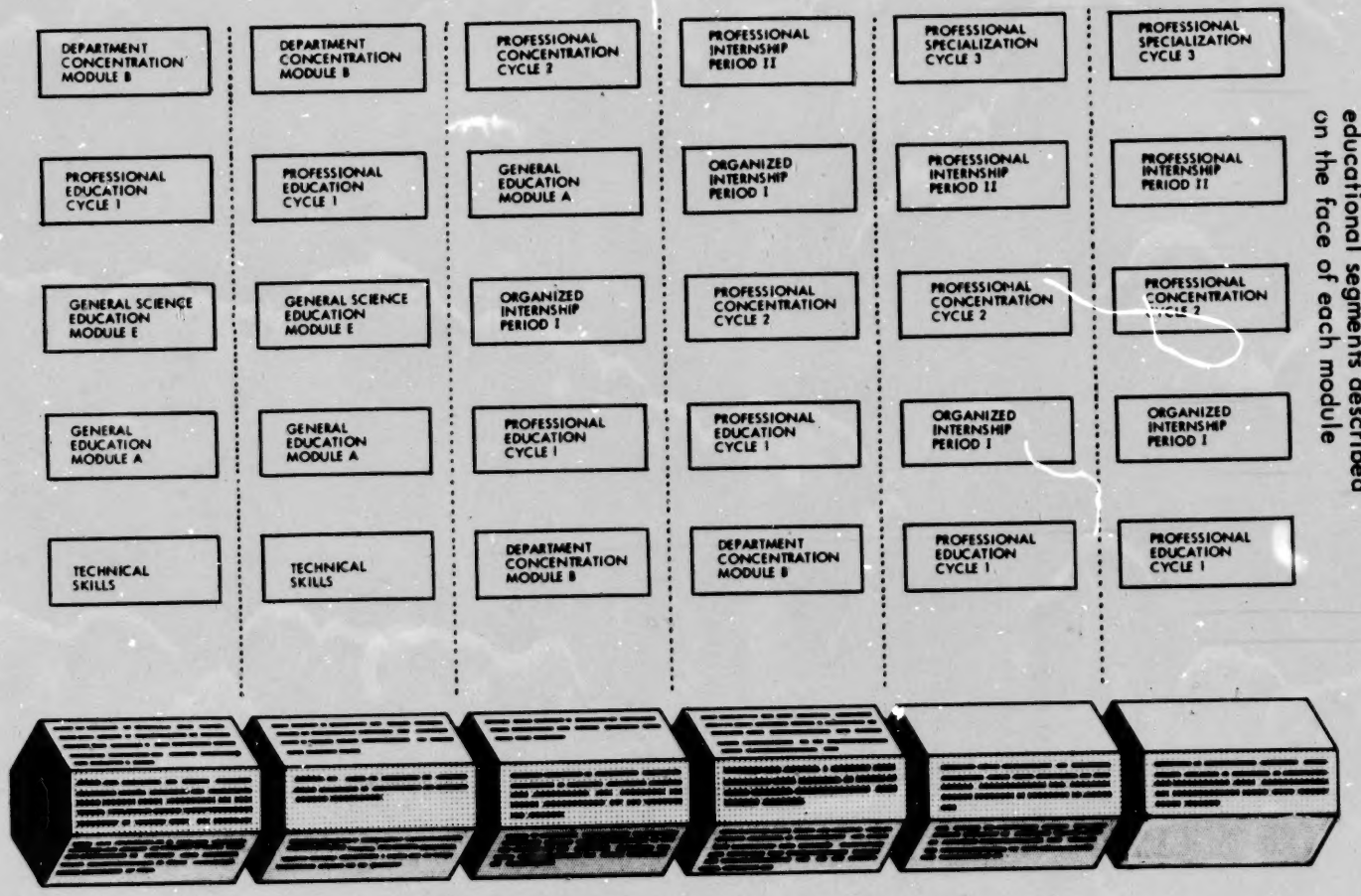
The conceptual framework for a national pattern of environmental design education that could meet these two usually conflicting criteria was based on a definition of nine distinct types of educational program. These nine segments have been described in terms that are broad enough to allow schools to set their own policy for any

of the programs they wish to offer. Yet the segments are clearly enough defined to prevent any serious overlapping among them. (See page 30 for the definition of the nine segments.) Four of the nine program segments are devoted to professional education, three are aspects of general education and two are periods of internship.

The academic training period was divided into six time modules in order to permit the student to shift (generally at the end of each two years of study) from one program to another. The combination of the nine program types distributed over six time modules is represented in a working model which is illustrated by the sketch on the following page. Each of the six time modules contains five possible programs that a student may take. The blank face on the six-sided module represents the option to terminate an educational career at the end of any two year period.

A school would use the model to determine which of the nine types of programs it wanted to offer. The realization that on a nationwide basis all nine kinds of program would be offered in many versions would relieve educators of the obligation to encompass all aspects of environmental design within their own school. It would allow schools to concentrate their efforts on the portions of the educational process they feel best qualified to offer.

A student would use the model at intervals during his career to choose the programs that best match his aptitudes and motivations as they develop. He would no longer have to commit himself to a rigid four to eight year long school career on the basis of his understanding of his abilities and interests during the last year of high school.


DEPARTMENT CONCENTRATION MODULE B
PROFESSIONAL EDUCATION CYCLE 1
GENERAL SCIENCE EDUCATION MODULE E
GENERAL EDUCATION MODULE A
TECHNICAL SKILLS
DEPARTMENT CONCENTRATION MODULE B
PROFESSIONAL EDUCATION CYCLE 1
GENERAL SCIENCE EDUCATION MODULE E
GENERAL EDUCATION MODULE A
TECHNICAL SKILLS
PROFESSIONAL CONCENTRATION CYCLE 2
GENERAL EDUCATION MODULE A
ORGANIZED INTERNSHIP PERIOD I
PROFESSIONAL EDUCATION CYCLE 1
DEPARTMENT CONCENTRATION MODULE B
PROFESSIONAL INTERNSHIP PERIOD II
ORGANIZED INTERNSHIP PERIOD I
PROFESSIONAL CONCENTRATION CYCLE 2
PROFESSIONAL EDUCATION CYCLE 1
DEPARTMENT CONCENTRATION MODULE B
PROFESSIONAL SPECIALIZATION CYCLE 3
PROFESSIONAL INTERNSHIP PERIOD II
PROFESSIONAL CONCENTRATION CYCLE 2
ORGANIZED INTERNSHIP PERIOD I
PROFESSIONAL EDUCATION CYCLE 1
PROFESSIONAL SPECIALIZATION CYCLE 3
PROFESSIONAL INTERNSHIP PERIOD II
PROFESSIONAL CONCENTRATION CYCLE 2
ORGANIZED INTERNSHIP PERIOD I
PROFESSIONAL EDUCATION CYCLE 1
educational segments described on the face of each module

MODULAR JOINTED FRAMEWORK FOR ENVIRONMENTAL EDUCATION

It should be noted that two of the nine programs would not be taken in residence at a school. These are the two internship periods. The internship was divided into two parts to reflect two differing kinds of practical experience that are required. One, termed Organized Internship, would be one year long and would involve observation and study of a wide range of professional activity. The other, called Professional Internship, would emphasize participation in a specific set of tasks.

The joints between the modules of the model are an important part of the concept. They represent choice points for the student as well as possible termination points for the various educational programs. At each choice point, a student can select any one of the five programs listed on the next module (except those which he has already taken). One other restriction in choice would be that the three cycles of professional education and the two periods of internship would have to be taken in order (but the order could be interrupted by other types of educational programs). On their part, the schools would give formal recognition to the student, in the form of a certificate or degree, at the completion of each module.

The full description of each of the nine types of educational program contained in the model is as follows:

Technical Skills:

> Training in the skills needed to carry out established procedures used by supervised teams in professional offices (and government agencies) for the production of analytical studies, reports, contracts, specifications and working drawings; for estimating and cost control; for project control in the office and in the field.

Professional Education: Cycle 1

Introduction to the broad range of problem-solving activities in the various stages and the many scales dealt with by the environmental design professions. This program to introduce the use of history and theory; the programming of human needs and resources and methods of environmental design synthesis and evaluation.

Professional Concentration: Cycle 2

Students will concentrate in a specific area within the broad range of environmental design responsibilities. Schools to develop one or more concentration options focused upon skills (e.g., technology, economics, programming, etc.) or scales (e.g., region, metropolitan area, institutional facility, building or component).

Professional Specialization: Cycle 3

Intensive study and creative research in a particular aspect of the environmental design responsibility. This program may be offered within the discipline of specialization (e.g., law, economics, physics) or as a joint program with a school of environmental design. Leads to a career as a professional consultant, researcher, scholar or teacher.

General Education: Module A

A balanced program of college level courses of broad scope in the areas of the humanities, the social sciences, natural sciences and math. To include at least one learning experience in the area of environmental studies set in the framework of liberal education.

General Science Education: Module E

College level courses of broad scope with special emphasis on the concepts and methods of mathematics and science. Related work in the humanities and social sciences. To include at least one learning experience in the area of environmental studies.

Departmental Concentration: Module B

A college level program with concentration in considerable depth in a major field of study (e.g., sociology, economics, civil engineering, physics, etc.) and a broad selection of minor fields and electives. Schools to develop departmental concentrations and electives in environmental studies according to their strengths.

Organized Internship: Period I

> A period of internship in professional activity to be supervised jointly by the schools and the professions. Experience in this period to include the widest possible range of professional responsibility, organized seminars and written papers devoted to the analysis and evaluation of the experiences of internship.

Professional Internship: Period II

> A second period of internship leading to recognition as a qualified professional in an area of environmental design. During this period the intern should be able to work independently, earn a reasonable salary and make an economic contribution to his organization.

If educational programs are fitted into the pattern set forth by the model, there will be about one thousand possible educational careers open to students who want to work in the field of environmental design. The table on page 36 shows the results of a calculation of all these possibilities. This calculation does not take into account the options suggested in Departmental Concentration and Professional Cycles 2 and 3. If these options are included, the number of different educational opportunities would be several thousand. This is in marked contrast to the dozen or so different careers that are available today for anyone seeking to prepare himself for the task of

environmental design. Page 37 illustrates thirty sample careers out of the thousands that are possible within this concept.

In order to define the courses and activities that would make up each one of the nine segments contained in the modular-jointed framework for environmental design education, the study has formulated a method for curriculum development and evaluation which is described in the next section.

3. A Method for Curriculum Development and Evaluation

There are a finite number of elements which can be dealt with and changed in order to shape an educational program for environmental design. They may be defined as follows:

I. Human Resources
   - A. Students
   - B. Teachers

II. Institutional Resources
   - A. Administrative structure
   - B. Curriculum
     1. Form
        - a. time or duration
        - b. sequence or pattern
        - c. techniques of communication, methods of teaching
     2. Content
        - a. substantive information
        - b. attitude or ethic
        - c. process or behavior

MODULE

	1		2		3		4		5		6	
	number	%	number	%	number	%	number	%	number	%	number	%
General Science Education: Module E	1	20	4	20								
Technical Skills:	1	20	4	20								
General Education: Module A	1	20	4	20	12	19						
Departmental Concentration: Module B	1	20	4	20	12	19	30	20				
Professional Education: Cycle 1	1	20	4	20	12	19	24	16	32	11	20	05
Professional Concentration: Cycle 2					8	12	32	21	72	26	96	23
Professional Specialization: Cycle 3									46	16	118	28
Organized Internship: Period 1					20	31	44	30	55	20	55	13
Professional Internship: Period 11							20	13	75	27	130	31
total programs for each module					64		150		280		419	

TOTAL POSSIBLE PROGRAMS = 938

does not include options in professional cycles 2 and 3

CALCULATION OF THE NUMBER OF CAREERS POSSIBLE WITHIN THE MODULAR JOINTED STRUCTURE OF ENVIRONMENTAL DESIGN EDUCATION

sample career types	module number 1	2	3	4	5	6
1	PROF EDUCATIN CYC 1					
2	TECHNICAL SKILLS					
3	GENL EDUCATIN MD A	PROF EDUCATIN CYC 1				
4	GENL EDUCATIN MD A	TECHNICAL SKILLS				
5	TECHNICAL SKILLS	PROF EDUCATIN CYC 1				
6	TECHNICAL SKILLS	GENL EDUCATIN MD A				
7	PROF EDUCATIN CYC 1	TECHNICAL SKILLS	ORGN INTRSHIP PER I			
8	GENL EDUCATIN MD A	GEN SCI EDUCN MD E	PROF EDUCATIN CYC 1			
9	TECHNICAL SKILLS	PROF EDUCATIN CYC 1	ORGN INTRSHIP PER I			
10	TECHNICAL SKILLS	GENL EDUCATIN MD A	DEPT CONCNTRN MD B			
11	DEPT CONCNTRN MD B	GEN SCI EDUCN MD E	PROF EDUCATIN CYC 1	ORGN INTRSHIP PER I		
12	PROF EDUCATIN CYC 1	GENL EDUCATIN MD A	PROF CONCNTRN CYC 2	ORGN INTRSHIP PER I		
13	GEN SCI EDUCN MD E	DEPT CONCNTRN MD B	ORGN INTRSHIP PER I	PROF EDUCATIN CYC 1		
14	GENL EDUCATIN MD A	DEPT CONCNTRN MD B	ORGN INTRSHIP PER I	PROF EDUCATIN CYC 1		
15	GENL EDUCATIN MD A	TECHNICAL SKILLS	ORGN INTRSHIP PER I	PROF EDUCATIN CYC 1		
16	TECHNICAL SKILLS	GENL EDUCATIN MD A	DEPT CONCNTRN MD B	ORGN INTRSHIP PER I		
17	DEPT CONCNTRN MD B	GENL EDUCATIN MD A	PROF EDUCATIN CYC 1	ORGN INTRSHIP PER I	PROF CONCNTRN CYC 2	
18	PROF EDUCATIN CYC 1	GEN SCI EDUCN MD E	PROF CONCNTRN CYC 2	ORGN INTRSHIP PER I	PROF INTRSHP PER II	
19	PROF EDUCATIN CYC 1	GENL EDUCATIN MD A	ORGN INTRSHIP PER I	PROF CONCNTRN CYC 2	PROF INTRSHP PER II	
20	GEN SCI EDUCN MD E	DEPT CONCNTRN MD B	PROF EDUCATIN CYC 1	ORGN INTRSHIP PER I	PROF INTRSHP PER II	
21	GEN SCI EDUCN MD E	PROF EDUCATIN CYC 1	ORGN INTRSHIP PER I	PROF INTRSHIP PER II	PROF CONCNTRN CYC 2	
22	GEN SCI EDUCN MD E	TECHNICAL SKILLS	ORGN INTRSHIP PER I	PROF EDUCATIN CYC 1	PROF CONCNTRN CYC 2	
23	GENL EDUCATIN MD A	PROF EDUCATIN CYC 1	PROF CONCNTRN CYC 2	ORGN INTRSHIP PER I	PROF SPECLZAN CYC 3	
24	TECHNICAL SKILLS	GENL EDUCATIN MD A	PROF EDUCATIN CYC 1	ORGN INTRSHIP PER I	PROF CONCNTRN CYC 2	
25	PROF EDUCATIN CYC 1	GEN SCI EDUCN MD E	PROF CONCNTRN CYC 2	ORGN INTRSHIP PER I	PROF INTRSHP PER II	PROF SPECLZAN CYC 3
26	PROF EDUCATIN CYC 1	GENL EDUCATIN MD A	ORGN INTRSHIP PER I	DEPT CONCNTRN MD B	PROF INTRSHP PER II	PROF CONCNTRN CYC 2
27	GEN SCI EDUCN MD E	DEPT CONCNTRN MD B	ORGN INTRSHIP PER I	PROF EDUCATIN CYC 1	PROF INTRSHP PER II	PROF CONCNTRN CYC 2
28	GENL EDUCATIN MD A	DEPT CONCNTRN MD B	PROF EDUCATIN CYC 1	PROF CONCNTRN CYC 2	ORGN INTRSHIP PER I	PROF SPECLZAN CYC 3
29	GENL EDUCATIN MD A	PROF EDUCATIN CYC 1	PROF CONCNTRN CYC 2	DEPT CONCNTRN MD B	ORGN INTRSHIP PER I	PROF SPECLZAN CYC 3
30	TECHNICAL SKILLS	GENL EDUCATIN MD A	ORGN INTRSHIP PER I	PROF EDUCATIN CYC 1	PROF CONCNTRN CYC 2	PROF INTRSHP PER II

SAMPLE EDUCATIONAL CAREERS BASED ON MODULAR JOINTED FRAMEWORK FOR ENVIRONMENTAL DESIGN EDUCATION

III. Material Resources
  A. Funds
  B. Physical Plant

By making changes within any one of these categories, a school can change the nature of its end product; the student's education. By a process of elimination, the study selected two items from this list that show the greatest promise as a basis for curriculum planning. Each school has a limited amount of time and staff resources available for the vital task of curriculum development. By identifying those elements of the educational process which promise to yield the greatest benefits in the planning effort, the method suggested here can help schools make the most effective use of these resources.

The two elements which should be analyzed and planned before any others are the techniques of communication (methods of teaching) and the nature of the abilities desired for students described in terms of process or behavior. When these two have been clearly defined there is a sound basis for action on all of the other elements listed.

The traditional method of curriculum description in terms of course titles, subject matter, time sequences and credits has not been an adequate vehicle for curriculum development. It does not provide a sound basis for experimentation and evaluation. Nor does it give a realistic picture of the actual learning process which takes place within the school.

The method for curriculum development suggested by the study requires that two sets of statements be written to describe each course within one of the segments of

the modular framework described in the preceeding section. One set of statements sets forth in operational language a description of the behavior that a student should be able to demonstrate as a result of having taken the course or program. A small sample of the many statements that might be required is given below as an illustration. An appendix of this reports lists many more samples of such statements collected from individuals and schools during the course of the study. (Some of these were prepared with financial support from the AIA Research Project.) The principal criterion for the adequacy of such statements is whether or not it can be observed that a student can in fact demonstrate the behavior that is described.

Some Sample Statements of Educational Objectives

A student (or graduate) should be able to:

1. Identify the boundaries of the problem he is planning to solve by listing the people and groups whose needs and activities he feels must be accommodated and the resources of land, time, money and skill that he feels will actually be available.

2. Analyze the boundaries of the problem as seen by the client, user and community to isolate areas of disagreement. Plan a strategy of negotiation and/or education to minimize poorly matched views of the problem.

3. Interview and observe representatives of the client, user and community as a basis for

specific statements of the needs that are to be satisfied by his professional services. These statements should be in a form that permits them to be used as a check list for evaluation of his proposals.

4. Identify needs of the client, user and community that he feels cannot be satisfied with the resources available or by physical planning alone.

5. Predict conflicts between concurrent needs or between needs and resources, and describe alternate policies and procedures that embody different rankings of priority.

6. Use available data and observation to delineate movement patterns of people, vehicles and things related to the activities to be accommodated in the solution of the problem.

7. Simulate numerous progressions of space, form, volume, level and light along each movement pattern in order to evaluate the best match with the identified needs of the user.

8. Predict the visual elements observed by the user of a movement system which will be grouped into systems or isolated events that will reinforce a sense of orientation.

9. Specify environmental criteria for each activity to be accommodated by stating the optimum tolerance range and time sequence desired for: air temperature, radiant temperature, humidity, air motion, odor and cleanliness of air; illumination levels and distribution pattern by daylight and electric sources, color for electric sources, background noise level, reverberation time, speech privacy level, impact noise rating.

10. Know where to find continuing reports of research on the human response to the environmental conditions and be able to interpret the language of these reports in terms of design criteria.

11. Predict the building skills required and the relative time, cost and sequence of operations for the number of recognized building assemblies and for innovated assemblies applied to a structure.

12. Visualize the number of recognized or innovated complete structural systems as a three dimensional image and match these with proposed spatial and mechanical schemes in order to identify the best physical integration of systems.

13. Outline the form for an economic analysis of alternative structural systems and specify the criteria for choice.

The other type of statement which is required for curriculum development is a description of the full range of teaching methods or learning experiences that will be used. A summary of some of the types of descriptions that are possible is presented below:

A. Lecture and Demonstration
   1. Individual faculty member
   2. Faculty team
   3. Visiting lecturer
   4. Visiting team
   5. Mixed team

B. Group discussion, questioning, and report
   1. Structured discussion, led by faculty member
   2. Student led discussion
   3. Small group seminar
   4. Group work project

C. Independent study
   1. Review of current periodicals, newspapers and books
   2. Research projects over longer periods
   3. Student composition of basic program

D. Observation by student
   1. Construction process
   2. Office practice
   3. Political and social group meetings
   4. Action of public agencies
   5. Land use and activities surveys in field
   6. Student-made films, tapes, or written records of activities in field.

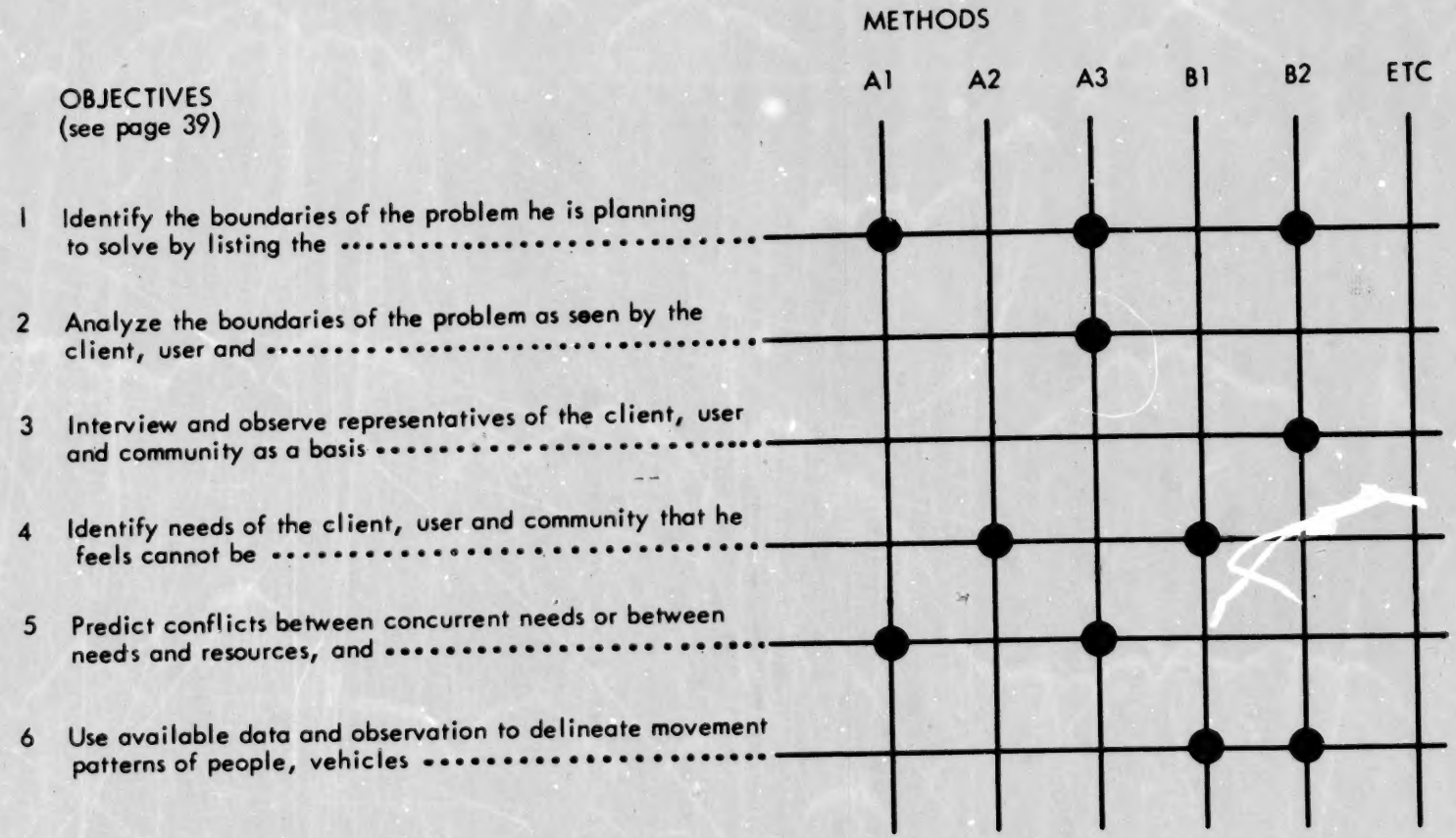
E. Simulation techniques
   1. Role-playing (conferences with client, consultants, engineers, etc.)
   2. Construction of models or mock-ups
   3. Measured drawing and analysis of materials, methods, systems
   4. Simulation games

F. Actual practice
   1. Periods of office practice
   2. Periods of construction work
   3. Periods of residence and study in urban or other area different from student's home/campus background
   4. Working teams with other disciplines

G. Teaching aids
   1. Film and tape presentations
   2. Still projections
   3. Diagrams and drawings
   4. Programmed texts
   5. Working models
   6. Television systems

H. Criticism and evaluation
   1. Design jury
   2. Scheduled evaluations by team of disciplines
   3. Student self or group evaluation
   4. Competitions
   5. Written examinations

Course descriptions may be developed with the aid of the chart which is shown on the following page. Along the side of this chart all of the objectives for a course are listed. Along the top of the chart, the full range of learning experiences is itemized. The conduct of the course is determined by selecting the teaching method or methods that we judged to be most likely to produce the behavior described in each of the objectives. The selected intersections are marked and translated into a series of sentences which constitute the course description.


METHODS
A1
A2
A3
B1
B2
ETC
OBJECTIVES
(see page 39)
1 Identify the boundaries of the problem he is planning to solve by listing the .....
2 Analyze the boundaries of the problem as seen by the client, user and .....
3 Interview and observe representatives of the client, user and community as a basis .....
4 Identify needs of the client, user and community that he feels cannot be .....
5 Predict conflicts between concurrent needs or between needs and resources, and .....
6 Use available data and observation to delineate movement patterns of people, vehicles .....

SAMPLE OF THE CHART USED FOR MATCHING OBJECTIVES AND TEACHING METHODS

The most difficult aspect of the method for curriculum development described here is the construction of educational objectives. This task requires a searching analysis of professional abilities. Several methods have been found which may lead to the most useful kind of statement. One procedure which often produces excellent results has been called "brain-storming." This method requires a person or group to propose ideas as freely and rapidly as possible without trying to evaluate them until some later time.

Another method which can be helpful concentrates upon the verb that will be used in the statement of the objective. It has been found that the verb is the key word in such a statement because the main intent is the description of behavior. Often it has been found that by starting with a list of verbs, many objectives are brought to mind that might otherwise have been neglected. The list below is a sample of some of the kinds of verbs that may be used:

observe	separate	estimate	interview
search	select	predict	describe
identify	exclude	project	state
find	specify	formulate	inform
determine	set criteria	resolve	support
test	assign	revise	implement
analyze	balance	visualize	define
classify	schedule	imagine	demonstrate
list	synthesize	evaluate	represent
rank	group	direct	simulate
compare	combine	manage	outline
match	incorporate	transmit	diagram
limit	decide	advocate	quantify
isolate	hypothesize	discuss	model

A third method of developing useful objectives is modeled on the "critical incident" technique sometimes used by clinical psychologists. This method can make use of interviews of environmental designers who have effectively solved a significant problem. They are asked to describe the key incidents that determined the outcome of the design process. These key incidents are used as a basis for statements of educational objectives. This method may use introspection as well as interviews as its basis.

All of the methods sketched above rely upon the building up of many independently derived statements until some pattern for a course emerges. Another approach is deductive rather than inductive. The model of the environmental design task described in an earlier section of this report may be used as a guide for the kinds of detailed educational objectives that are necessary. Each of the two hundred and sixteen activities described in the model implies a set of more detailed behaviors that are required to accomplish that activity. The curriculum development effort may focus more exactly on the statements that are needed by selecting that set of activities from the two hundred and sixteen that are essential to a particular course or program.

The principle value of using the process outlined above is the basis that it provides for continuing evaluation and revision. And it is only by continuing experimentation and evaluation that the level of effectiveness of environmental design education can be raised rapidly enough to keep up with the revolution of rising expectations.

RECOMMENDATIONS OF THE STUDY

1. Task and Team Orientation

The teaching and practice of all aspects of the design of the man-made environment must be related more closely than they have been in the past. Our growing understanding of the close relation of every design decision, from the regional scale down to the smallest component, makes this essential. And our knowledge of the close linkages between changes in the physical environment and the social, economic and political setting for human affairs makes it clear that a wider range of abilities, disciplines and professions must work together for effective planning and design to be possible.

The study recommends that all educational policy changes be made in recognition of a new way of defining professional work in terms of the task or problem. Such changes should be developed with a clear understanding of the specific but partial contribution that each student or practitioner will make to the problem-solving team. This does not at all require that the traditional disciplines give up their identity or their professional standards. But it does demand that professional organizations, registration boards and accrediting boards work together to create a better related institutional setting for task oriented team work in the process of environmental design. The concepts of the task and the team that are embodied in the following two recommendations are suggested as a basis for evolving this new institutional setting.

2. A Shared Concept of the Task

A concept of the overall task of environmental design that can be understood and shared by all those who take part in education and practice is essential. Such a concept is the only foundation possible if we are to be able to relate the many disciplines and professions that must work together to solve the large and complex problems of planning and design faced by society today.

The study has evolved such a concept. Its use is recommended in setting educational policy and in the development of new links between professional organizations, registration boards and accrediting boards. The concept is represented in the form of a three dimensional diagram (see page 25) which describes the steps in the problem-solving process, the divisions of the scope of work and the gradations of scale that are embodied in the overall task of environmental design. This model indicates two hundred and sixteen categories of ability that are required in environmental design. An understanding of human resources makes it clear that no single profession, discipline or individual can ever hope to make a contribution in all two hundred and sixteen categories. But every individual, discipline and profession can use these categories to clarify its own role in the overall task and to understand the relationship of that role with the activities of others.

The use of the two hundred and sixteen statements of the conceptual model is the process recommended by the study. The constantly evolving product of this process will be changing educational policies and changing professional relationships. The exact nature of these policies and relationships at any given time is in the hands of those who actually make the decisions at the schools and within the professional groups.

3. A National Framework for the Education of the Team

It would be virtually impossible for any one school to provide an education in depth for all of the abilities needed on the environmental design team. But all of the schools of the nation, taken together, should be able to develop the diverse understanding and skill that is required. The problem, then, is to find a national structure for environmental design education that would allow each school to formulate an educational policy building upon its own special strengths and resources. This structure should, at the same time, give the individual student the widest choice of educational careers so that he can select the programs that are well matched with his own motivation and ability. Another requirement for a national structure for environmental design education is that it make clear the relationships among all of the areas of concentration chosen independently by each school and each student.

This study has developed a conceptual design for an overall structure of environmental design education that satisfies the often conflicting requirements outlined in the preceding paragraph. The concept is represented by a three dimensional model consisting of six hexagonal modules (see illustration, page 30). Each of the modules represents a period of time in the career of a student (today, most of these periods would require two years of work, but it is possible for the length of time to vary in the future). The joints between the modules represent choice points for the student. When he reaches any choice point, the student may go on to any one of five programs listed on the following module or terminate his education at that point.

There are nine basic types of educational program or segments defined by the model: four are devoted to professional education; three are aspects of general education, and two are periods of internship. By means of the modular jointed structure, these nine segments can be combined in different ways to create several thousand different but related educational careers. A student moving through any one of these many options would have an opportunity to develop a unique set of abilities to bring to the problem oriented environmental design team.

The modular-jointed structure for environmental design education was developed with the realization that it is not likely that most schools in the nation will be able to make radical changes in their programs in the short run. For this reason the model was designed to relate most present day programs (in all disciplines) and the way that they can realistically evolve over the coming years.

The use of the modular-jointed structure for environmental design education is the process recommended by the study. Decisions about the products of this model--constantly evolving school programs and changing educational careers--remain in the hands of the schools and the students.

4. Three Major Goals for Environmental Design Education

Past studies of education for environmental design education have frequently set goals in terms of aims for institutions. This study recommends a change of focus that would concentrate on goals for the kind of human behavior, understanding and ability we should seek through the educational process.

The study recommends three major goals that should set the pattern for the particular policies, strategies and operating procedures to be decided upon independently by the schools. The three goals are:

1. A student (or graduate) should be able to work effectively within the real world constraints that shape present day practice.

2. A student (or graduate) should be able to comprehend the continuing changes in the social, economic, political, scientific and technological setting of our society. He should be able to constantly renew and adapt his abilities in response to these changes.

3. A student (or graduate) should be able to formulate a concept of a better environment beyond present day constraints to give direction to his adaptability to change.

There is little question that most educators support these three broad goals. An examination of educational practice in the schools today makes it clear that policies which focus on any one of the three goals are most often in conflict with the other two. The study has found that the central problem in setting basic educational policy is finding a mix of policies and procedures that will strike a balance among all three of these goals. The character and position of a school is largely determined by the emphasis given to the three conflicting aims.

The study recommends that the schools and the professions use the three goal statements as a basis for the process of reevaluation of educational policies and practices. The

constantly changing product of this review, the priorities and emphasis of any specific educational program must be decided upon by each school.

5. A Method for Curriculum Development

The previous recommendations provide the basis for the evolution of a national policy for environmental design education. They provide a set of concepts which allow students, schools and professional organizations to clarify their own particular role within the national framework by a democratic process of self-evaluation and independent choice.

As these basic choices are made, the faculties and administrators of the schools must find a procedure for translating their policies into the form of actual learning experiences and activities within their schools. The investigations of this study indicate that research in education over the past 50 years has not been able to devise any magic formulas for the creation of human understanding and ability. But the study has discovered one process of curriculum development that can make the most effective use of the human resources of faculty and students in moving toward the realization of a chosen educational policy.

As one basis for this discovery, the study analyzed hundreds of curriculum descriptions (one hundred and eleven of which are recorded in Appendix 1 of this report) and compared these with the educational activities at the schools. As a result of this analysis, one of the most telling conclusions of the study was reached. The very language and format traditionally used in curriculum description and design--that is, the naming of courses

and subject matter, the assignment of credit hours and sequences, is not an adequate basis for carrying out educational policies and plans. It was found that there has been little or no consistent relationship between conventional course outlines, the realities of the educational process or the stated policies of a school. For this reason, the study recommends the adoption of a new kind of language and format for the description of curricula. Course descriptions should be composed of two types of statements. The first type are operational statements of educational objectives. Such statements would describe the observable behavior a student should be able to demonstrate when he completes a course or program. The second type are detailed descriptions of learning situations and experiences. Examples of such statements are given in earlier sections and Appendix 2 of this report. The format for course descriptions is a diagram (see illustration, page 44) which matches each of the many objectives of a course with the learning experiences that are most likely to evoke the desired behavior on the part of the student.

Carrying out the procedures for curriculum improvement recommended here has proven to be a most demanding task for the individuals and schools that have worked with the research project. The study has searched for but has not found an easier method to insure that the activities within a school support the goals and policies of that school. There is no way to escape the conclusion that an unprecedented level of effort will be required if we are to make significant progress in environmental design education.

6. A Method for Continuing Evaluation and Renewal

The language and format recommended above as the process for curriculum improvement has the potential for bringing educational policy, course descriptions and the day-to-day efforts of faculty and students into close correspondence. But the greatest strength of the method over the long run lies in the solid basis it provides for continuing evaluation and renewal of educational programs. Once educational objectives are stated in operational language, that is, in terms of observable behavior, the means for judging student performance as well as the effectiveness of courses and programs are available.

The study recommends that the evaluation process be pursued at four levels. The first, and probably most important level is self-evaluation by teachers and students. Each faculty member should have the opportunity to frame his own course objectives. The extent to which he collaborates with the administration and his colleagues in doing this depends upon the accepted practices of his school. Students will benefit if they know what these objectives are. At appropriate intervals students are asked to do work which will reveal whether or not they have been able to reach the level of performance specified in the statement of the objective. Asking students to evaluate their own performance on the basis of clearly stated objectives can have great motivating power.

Teachers may use their own evaluations of students for broader purposes than ranking or grading students. The performance of students may indicate that the objective itself was undesirable or unclear and thus lead to a new and better statement of objectives. Or this process can serve as a basis for experimentation with teaching methods, eventually leading to a better match between an objective and the methods used to reach that objective.

At the second level of evaluation, the administration of a school and designated faculty may evaluate various courses or sequences of courses in the curriculum to determine whether the objectives and the performance of the students correspond to the basic role the school has established for itself. Such evaluations also present the opportunity for reconsideration of the school's fundamental policy.

Finally, there are the methods of evaluation that already have an established place in professional education. The third is the registration examination and the fourth the school accrediting visit. This study recommends that these two functions be clarified by adopting the practice of stating objectives in operational, behavioral terms. In this way the basis for legal and professional recognition and the academic experience can be brought into the closest possible harmony.

The method prescribed here for curriculum development and evaluation can be applied by any school to its present programs. But it is when a school attempts to innovate that the method will bring the greatest benefits. Far too many attempts at innovation in the schools have been thwarted by the lack of adequate means for describing their intent to all those who must support any sustained effort to search for better ways of teaching. And many hopeful innovations have been dropped for lack of a generally agreed upon means of evaluating their impact.

The study recommends that all attempts at educational innovation be described in terms of operational objectives. The objectives and the changes in student performance that result from the innovation should be reported to all schools. In this way there can be a focused discussion of objectives among the schools and the professions. Innovation that is deemed successful may be adopted by other

schools, perhaps shortcutting many years of experimentation. And innovations that do not have the hoped for outcome need not be repeated in the same form by others. The process of trial and error that we must continue to pursue as long as there is no workable theoretical basis for the process of education can be given purpose and direction by the use of the procedures recommended here.

7. Continuity for Environmental Design Education

The concepts and methods set forth by this study can strengthen the competence of the environmental design team during the normal period of academic training. But more than the academic training of professionals must be changed if this team is to develop its fullest potential. The client has always had a powerful influence on the design process. And today, user groups which do not necessarily hold the purse strings are finding a more powerful voice in the design decision-making process. Unless there is some shared understanding of the way our environment affects the quality of life among the client, the user and the professional, even the most finely tuned design team can be deflected from an adequate solution to a problem.

This study recommends renewed efforts to develop a new kind of educational experience in elementary schools, secondary schools and in higher education for other fields. This experience should enhance the sensitivity and awareness of non-professionals to the interactions between the physical environment and all other aspects of their lives. In this way, a continuity will be developed between the frame of reference of the environmental design professional and the society he serves.

Another type of continuity in education is a vital adjunct to professional training. Unless opportunities are provided for continuing education on a regular basis, it will become more and more difficult to define the scope of work within the normal academic training period. The idea is still accepted implicitly at many schools that what is learned in a period of four years to six years must carry a student through his entire professional career. To the extent that we are capable of developing more powerful planning and design concepts and methods through research and experimentation in the field, this idea of a termination point for education becomes less and less tenable. If the opportunity for continuing education is open to all students, it becomes possible to define more realistic objectives for regular academic training programs.

Creating sound concepts, materials and teaching skills for non-professional education as well as for continuing professional education is both difficult and expensive. There would be a number of advantages to a cooperative effort by the professional organizations related to the task of environmental design to sponsor and guide a substantial curriculum development project.

8. Institutes of Advanced Studies for Educators

There is a shortage of highly qualified teachers at almost every school in the field of environmental design. Professional opportunities outside the schools have never been more attractive. There is a growing interest in the field among young people who are clamoring for admission to the schools. And if environmental design education is to spread beyond the bounds of the professional school as suggested in the previous recommendation, the need for good teachers will become even more critical.

Research and scholarship at the Doctoral level in the field of environmental design has not yet been developed as it has in other disciplines and professions. Thus environmental design lacks one important source of able teachers available in many fields. Some measures must be taken to create an equivalent generator of teaching strength and depth in the field of environmental design.

The study recommends that regional consortia of schools and professional organizations be formed to sponsor Institutes of Advanced Studies. Such Institutes should be set up to attract gifted teachers who need time away from the classroom and laboratory to develop new levels of understanding and ability. The Institutes should also open the way to an alternative career for talented people in practice who have not been motivated to teach.

The work of the Institutes should be based upon research and scholarship in a broad range of disciplines. By exploring the frontiers of knowledge, theory and practice, the men and women at the Institutes can forge the pattern for a more closely knit and effective environmental design team in the future. The support of industry, government and foundations should be sought in order to make appointment to one of the Institutes a compelling opportunity for the most able people.

9. Program Development for Professional Education

The emphasis in all of the recommendations made by the study has been upon processes for self-evaluation and self-development by the schools and, indeed, by students as well. It is neither possible nor desirable in this country for any authority to impose a set of policies upon the schools.

However, those familiar with the evolution of educational change recognize that there is a voluntary process through which successful programs and courses are widely copied. This process has mixed benefits. At best, it can spread the use of more effective new approaches throughout the nation. At worst, it can multiply the numbers of schools caught up in a purposeless fad. And often the system works so slowly that an idea is adopted by many schools after it has lost its relationship to present day problems.

There should be some way to take advantage of the fact that many schools do not hesitate to seek out and copy better approaches to teaching. At the same time, the pitfalls of copying untested or outmoded ideas should be avoided. The study recommends the establishment of one or several national centers for course development to be jointly sponsored by the environmental design professions.

At these centers, those teachers and practitioners who have a promising contribution to make could be brought together in working teams to develop and test new educational approaches. In this way, the many schools that realize their need and desire to copy educational ideas from others could be furnished with tested, reliable examples. This system of bringing together teachers, researchers and practitioners who are pioneering in important new areas of professional competence in short term, intensive working sessions can greatly speed the spread of useful innovation in education.